

# **Influence of Surface backscattering Statistics on the Spaceborne Radar Measurements of Rainfall**

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A major challenge for the TRMM (Tropical Rainfall Measuring Mission) precipitation radar is to improve the existing method for the estimation of Path Integrated Attenuation (PIA), which is needed by the TRMM rain profiling algorithm for computing attenuation-corrected radar reflectivity factor. Currently the TRMM standard algorithms use the surface reference techniques (SRTs) to perform such a PIA estimation. One version of the SRTs measures normalized radar cross section (NRCS) of surface within and outside the rainy area, and attribute the difference in measured NRCS to the PIA. In reality, the surface scattering is different inside and outside rain cells due to wave damping over ocean and moisture coating on vegetation and soil. Nevertheless this method is a rather efficient way to estimate bulk uncertainty in surface NRCS measurements. It can provide relatively reliable attenuation estimation when PIA is much larger than the surface NRCS uncertainty. Over ocean, the water surface is a relatively smooth and homogeneous target with high permittivity, resulting in high NRCS value with certain standard deviation. On the other hand, land surface has low permittivity, and is often very rough and heterogeneous, leading to weak surface signal (NRCS) with large standard deviation, especially at small incidence angles where coherent scattering is strong. Therefore there has been very limited success on estimating PIA over land. In this paper, we examine the statistical signatures of land surface NRCS of TRMM radar, and compare them with NSCAT data. Comparison is also made between TRMM radar and radiometer data. Possible improvement on existing SRTs is discussed.

\* Preferred Topic area: A.10 Clouds and Precipitation